Capital Structure and Firm's Life Cycle: An Iberian Study

Bruno Alexandre Rua Valente

201402286@fep.up.pt

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Supervisor

Júlio Fernando Seara Sequeira da Mota Lobão, PhD

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Biographical Note

In 1993, Bruno Alexandre Rua Valente was born in Lisbon. Graduated in Finance and Accounting in ISCTE-IUL, also in Lisbon in 2014. In the same year, he left for Porto, and started his Master's Degree in Finance from the School of Management and Economics at the University of Porto, because of his passion on financial markets. During this period, he was a member of the finance department of AIESEC in FEP and worked for a month as a phone banking assistant at Caixa Geral de Depósitos. In September of 2015, he moved again to Lisbon in order to join KPMG, more precisely in the transfer pricing department. In April 2017, still within KPMG, he moved to the corporate tax department.

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Abstract

Although there are a variety of capital structure determinants studied in the literature, the life cycle seems to be considered of peripheral importance. In fact, capital structure overlooks that firms have different capital requirements across their life cycle. In addition, the finance literature highlights various theoretical models that explain how the firms' life stages influence capital structure decisions, such as the Pecking Order, Trade-Off, Agency Cost and Diamond's Theories. Therefore, our study analyzes a set of 117 Iberian non-financial listed firms over the period of 2001 to 2016 with the main aim of assessing the sample companies' capital structure adjustment along their life cycle stages. We found a leverage adjustment rate for growing firms of 74%, 72% and 30% for short-term, long-term and total leverage, respectively, and a leverage adjustment rate for mature firms of 54%, 52% and 30% for short-term, long-term and total leverage, respectively. Also, we evidenced that Iberian companies in decline stages are going away from their target short-term and long-term leverages, but adjust their total leverage with a rate of 72%. For the total leverage, our results support the evidence of Ahsan et al. (2016) and Rehman et al. (2016). However, for the short- and long-term leverage, our results were not consistent with the literature. Additionaly, we verified a low-high-low pattern for short-term leverage consistent with the Trade-Off Theory and in accordance with the studies of Ahsan et al. (2016) and Rehman et al. (2016). For the remaining proxies of leverage (long-term and total), the patterns found were high-low-low.

Key-words: Capital structure; life cycle stages; leverage; adjustment rate; panel data.

JEL Classification: G32, C23, M21.

Resumo

Embora existam vários estudos sobre determinantes da estrutura de capital na literatura, o ciclo de vida parece ser considerado de importância periférica. De fato, a estrutura de capital negligencia que as empresas tenham requisitos de capital diferentes ao longo dos seus ciclos de vida. Além disso, a literatura financeira destaca vários modelos teóricos que explicam como as fases de vida das empresas influenciam as decisões da estrutura de capital, como as Teorias de *Pecking Order, Trade-Off, Agency Cost* e *Diamond*. Assim, o presente estudo analisou um conjunto de 117 empresas ibéricas não financeiras listadas no período de 2001 a 2016, com o principal objectivo de avaliar o ajustamento da estrutura de capital das empresas da amostra ao longo das suas fases do ciclo de vida. Observámos para empresas em crescimento uma taxa de ajustamento de 74%, 72% e 30% para a *leverage* de curto prazo, longo prazo e total, respetivamente, e para as empresas em fase de maturidade uma taxa de ajustamento de 54%, 52% e 30% para a *leverage* de curto prazo, longo prazo e total, respetivamente. No entanto, as empresas em fases de declínio estão a afastar-se das suas estruturas de capital de curto e longo prazo *target*, mas, por outro lado, ajustam a sua estrutura de capital total com uma taxa de 72%. Para a *leverage* total, os nossos resultados suportam a evidência de Ahsan et al. (2016) e Rehman et al. (2016). No entanto, para *leverage* de curto e de longo prazo, os resultados não são consistentes com a literatura. Adicionalmente, verificámos um padrão de *leverage* de curto prazo *low-high-low* consistente com a Teoria *do Trade-Off* e em conformidade com os estudos de Ahsan et al. (2016) e de Rehman et al. (2016). Para as restantes *proxies* da estrutura de capital (longo prazo e total), os padrões encontrados são *high-low-low*.

Palavras-chave: Estrutura de capital; fases de ciclo de vida; *leverage*; taxa de ajustamento; dados em painel.

Classificação JEL: G32, C23, M21.

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1. Introduction

As the literature states, there is no universal theory of the debt-equity choice and no reason to expect one (Myers, 2001). However, there are several factors that can influence the choice of the capital structure of a company, such as growth, profitability, size and leverage (Pinho, 2013; Castro et al., 2015), among others. Hence, it becomes important to address the various theories that attempt to explain this theme.

In accordance, the studies on capital structure started with the publication of Modigliani and Miller's article, in 1958. That publication had such an impact that many other researchers investigated this subject, leading to the rise of other theoretical perspectives on capital structure decisions, namely the introduction of taxes, the effect of bankruptcy costs, the Trade-Off Theory, the Agency Cost Theory, the Pecking Order Theory, among others.

By one of the others we mean life cycle, for example. The relevance and timeliness of this theme for companies, to which must be added the fact that conceptual theory and empirical evidence concerning the effect of firms' life stages in their capital structure are not consensual, were the main reasons for the present study. Also, there is little expression of studies and articles dedicated to this topic in Portugal and in Spain and there is no consensus on the identification of each stage of the life cycle. Notwithstanding, the capital structure has not been given due attention because firms have different capital requirements over their life cycle, therefore, studying this theme provides a greater understanding on the optimal capital structure and on the best way to identify each life cycle stage.

Hence, the general objective of the present study is to contribute to the literature review of the capital structure puzzle, trying to test whether the life cycle is an important factor to consider in the capital structure's decisions. Thus, by studying the impact of the firms' life stages in their capital structure we intend to conclude if the effects of the firms' life stages on capital structure are associated with the Pecking Order, Trade-Off, Agency Cost or Diamond's Theories and on the adjustment rate observed for each stage.

Our research sample is composed by 117 companies and comprises data over the period between 2001 and 2016, through the export of financial information contained in the Thomson Reuters Eikon database. To measure the degree of the relationship between

capital structure and life cycle stages, we first start to apply the methodology to identify the firms' life stages (dependent variable), which is the one used by Anthony and Ramesh (1992). Then, we estimated a regression model for the dependent variable leverage, according to three proxies: short-term leverage, measured as the ratio of short-term loan to total assets; long-term leverage that is the ratio of long-term loan to total assets; and total leverage, which translates into the ratio of total liabilities to total assets.

Further, this dissertation intends to assess the sample companies' capital structure adjustment along their life cycle stages, using a methodology also applied by Ahsan et al. (2016) and Rehman et al. (2016), who used a partial adjustment model with the assumption that the observed change in the capital structure is in function of the desired change.

We found that growing non-financial Iberian firms adjust their leverages by 74%, 72% and 30% for short-term, long-term and total leverage, respectively. Mature firms did it by 54%, 52% and 30% for short-term, long-term and total leverage, respectively. In what concerns declining firms, we concluded that, with the exception for total leverage which presented a high adjustment rate of 72%, firms in decline stages are going away from their target short- and long-term leverages.

These results were consistent with Ahsan et al. (2016) and Rehman et al. (2016), evidencing that when the total leverage is studied, companies adjust their capital structure in the stages of growth, maturity and decline. However, when the short- and long-term leverage is tested, the results for the decline stage have shown that firms do not follow an optimal capital structure and therefore these results are not consistent with these authors.

The structure of this study will proceed as follows. The second chapter presents the literature review, which addresses the main determinants of the capital structure, the main contributes on the life cycle framework and also some empirical studies regarding the relationship between both concepts. The third develops our hypotheses. In the fourth chapter, we describe the data and the methodology adopted. In the fifth chapter, we develop the empirical model, its results and its analysis. Finally, in the sixth chapter, we conclude on our findings, on our contribution and our recommendations for further future research.

2. Literature Review

In this chapter, we present the key classical theories regarding the two main frameworks of the research theme: Capital Structure and Life Cycle. We also present some of the most recent empirical studies that approached the relationship between both frameworks.

As the research subject indicates, it approaches two main frameworks: Capital Structure and Life Cycle. As both are usually studied separately, I decided to review the literature as such.

2.1. Capital Structure

Defined as the way a firm finances its assets through a combination of debt and equity (Schoroeder et al, 2005), capital structure is one of the most famous topics studied in the financial literature, even knowing beforehand that there is no universal theory of the debt-equity choice and no reason to expect one (Myers, 2001).

The first study of the capital structure problem started with the Traditional View released by David Durand in 1952, however, it was after the publication of the Modigliani and Miller article in 1958 that the capital structure study intensified.

For Durand (1952), the so-called traditional view is based on the existence of a perfect optimal combination of debt and equity that minimizes the weighted average cost of capital and maximizes the market value of a company. The author also argued the existence of a relation between the indebtedness of a company and its value, as the less equity a company uses, the greater its profit maximization will be. However, it should be noted that higher indebtedness carries a higher risk, which should be reflected in the cost required by creditors and in the return on equity. In addition, this study lacks a formal model, so it is not representative of a true theory.

Therefore, as mentioned, the real start began with the publication of Modigliani and Miller's article, in 1958. In this study, Modigliani and Miller objected to what had been stated by Durand (1952), by arguing that there is no optimal capital structure and that the value of a company is independent of its capital structure. However, the authors' approach was based on strong assumptions, such as perfect markets, investor rationality, homogeneous expectations, information symmetries, absence of taxes, transaction costs, bankruptcy costs and agency costs. Indeed, such assumptions do not represent reality.

In 1963, denoting a limitation on their previous study, the same authors published a new study, in which they revised and included the effect of taxes as determinants of the market value of a company, contradicting their initial idea in which they argued that the effect of income taxes was minimal and did not influence the value of a firm. With the exception of the absence of taxes, their previous assumptions remained in force. Hence, they concluded that a high income tax and financing expenses deductible in fiscal terms would mean greater tax savings which would increase its value of a company. In fact, the deduction of financing expenses would mean that the taxable income would be lower and, consequently, would generate less tax payable, which would certainly lead to an increase in the value of the company. This led to the conclusion that the capital structure is relevant in determining the value of a firm. In particular, it was concluded that indebtedness decreases the weighted average cost of capital and, consequently, increases the value of a company linearly. Therefore, its value is maximized with the minimization of equity. However, with the conclusion that the maximization of value arises when company's assets are totally financed with debt, the authors warned that no company should be fully indebted. Hence, this model should also be interpreted with some limitations, since it is inappropriate to reality.

A few years later, in 1977, Miller alone produced a model, under which he reinforced the idea of the tax effect on the capital structure by introducing the joint effect of corporate and personal income taxes. He concluded that the firm's value in equilibrium is independent of the capital structure adopted. Moreover, he sustained that the two tax effects cancelled each other out, so the optimal combination between equity and debt does not change the value of a firm.

Since the publication of Modigliani and Miller's (1958) theory, a vast literature was developed to investigate the robustness of their conclusions on investors' indifference between debt and equity. In fact, except for Dybvig and Zender (1986), the literature concluded that the first Modigliani and Miller (1958) proposition fails to hold in the presence of market imperfections since factors/determinants that could influence the capital structure of a firm were found. Thus, capital structure decisions are usually explained on the basis of the following theories: the introduction of Taxes, the effect of Bankruptcy Costs, Trade-Off, Agency Cost, and Pecking Order Theories, among others.

In order to clarify the association of each theory with the topic under analysis,

notwithstanding the scientific relevance of other themes, we will follow the structure proposed by Ahsan et al. (2016) and Rehman et al. (2016).

2.1.1. *Pecking Order Theory*

Based on studies related with information asymmetry and profitability, it was developed the Pecking Order Theory, which concludes that a firm orders its financing preferences as follows: first, a firm prefers internal funds; then, it choses external debt; and only as its last resource a firm choses equity (Myers, 1984; Myers and Majluf, 1984).

According to the Pecking Order Theory, a firm does not pursue a target capital structure, but instead follows a pattern in its financing policy which can be changed according to its opacity of information asymmetry, levels of profitability and financial needs.

2.1.2. *Trade-Off Theory*

Contradicting the theory above, the Trade-Off Theory emerged, establishing that companies seek an optimal capital structure (introducing the static trade-off concept), which can be obtained through a trade-off between costs and benefits associated with leverage (in a perfect market environment). Notwithstanding, it should be noted that an optimal capital structure can be influenced by several exogenous and endogenous factors that change over time, especially across firms' life cycle stages. Hence, according to Fischer et al. (1989), firms adjust their capital structure by making dynamic decisions (dynamic trade-off concept).

In order to obtain a larger tax shield benefit, a firm should raise more debt, in accordance with the Trade-Off Theory, irrespective of its life cycle stage. However, the increase of debt will increase also the firm bankruptcy and financial distress risk. Hence, it is necessary to reach a breakeven point between tax benefits and bankruptcy costs.

2.1.3. *Agency Cost Theory*

Moreover, Agency Cost Theory is also mentioned as one of the most relevant explanatory theories of capital structure. It should be emphasized that this theory is based on the existence of information and interest conflicts, which may arise between those involved in the activity of a company, such as managers, shareholders and creditors, with respect to the use of free cash flows and firm's resources. In fact, the companies that suffer most

from this are the ones that generate higher amounts of cash flows. This type of conflicts leads Jensen and Meckling (1976) to believe that the solution may lead to the use of an optimal level of debt, because debt repayments would reduce the available free cash flows, so managers would not have enough to invest in non-valuable businesses.

In addition, the increase of debt in the capital structure is most of the times caused by agency costs, because debt "enables managers to bond their promise to pay out future cash flows" (Jensen, 1986). According to Agency Cost Theory, firms use more debt in their capital structure when investors seek to pressure management to use funds efficiently.

2.1.4. *Diamond's Theory*

According to Diamond (1989), firm's reputation can explain its financing preferences, since reputation varies during a firm's life cycle. Effectively, firms in their earlier stages have less reputation, meaning that they have less confidence to raise debt, and they are also characterized by having high information asymmetry. As companies become more mature, they reduce their information asymmetry and eventually increase their reputation, putting them in a better position to raise debt. The same goes for companies in the declining stages, which already have a huge track record and a solid reputation that allows them a high debt capacity as well.

2.2. Life cycle

As observed in the literature review on the subject of capital structure, the life cycle has never really been approached as one of its explanatory theories. However it was approached as being part of some of the existing explanatory theories.

Nonetheless, the life cycle became an interest to researchers approximately in the period when capital structure theories started to be developed.

According to Black (1998), this theory is an extension of the product life cycle theory. Thus, in the same sense as products, companies usually progress through a set of life stages that start with birth and ends in death (Frielinghaus et al., 2005).

Hence, it was approached, as a field of study, the organizational life stage theory, based on which several students tried to understand the firm's development by its comparison

to human life cycle (Lippit and Schmidt, 1967; Adizes, 1979, Miller and Friesen, 1984; Black, 1998; Levie and Lichtenstein, 2008).

Several models in the last fifty years were generated which differ, not only in the number of stages and their classification criteria, but also in the way of determining of a particular phase. Meanwhile, there are two problems in understanding and employing the concept.

Firstly, there is no consensus on the definition of firms' life cycle stages due to the difficulty in choosing the model to be used. There are those who propose life cycle models with three phases (Anthony and Ramesh, 1992), four phases (Miller and Friesen, 1980; Quinn and Cameron, 1983), five phases (Miller and Friesen, 1984; Scott and Bruce, 1987; Dickinson, 2005; Dickinson, 2011) and ten phases (Adizes, 1979). Secondly, there is no consensus regarding the identification of each life cycle stage.

However, most of the theories and studies on life cycle agreed on growth, maturity and decline as the three stages of a firm's life cycle (Rehman et al., 2016), what could mean convergence between researchers on this subject.

To better clarify and help to answer these questions, Zhipeng, in 2006, developed a study called "A new methodology of measuring firm life cycle stages". In this sense, the authors described the three most common used methodologies for measuring life cycle stages.

The one approached by Miller and Friesen (1984) identified a five life cycle stages model, which is composed by birth, growth, maturity, revival and decline stages. For the classification of firms in each life stage, they applied numeric and descriptive criteria. In practice, they restricted the sample to companies that have been in existence for a long period of time (at least 20 years) and divided a firm's history into representative periods by examining all relevant information about the firm. In addition, they used firms' age in the definition of the birth phase. For the other stages it was used sales growth data. Zhipeng (2006) appointed as disadvantage the fact that researchers need to gather a tremendous amount of information on firms before they can identify and assign different periods. Also it does not allow a big sample (e.g. only 36 companies were studied).

The study of Anthony and Ramesh (1992) classified firms according to a three (or five) life cycle stages model, with three stages (growth, mature and stagnant) for univariate procedure, and two additional stages (growth/mature and mature/stagnant) used in the multivariate procedure. For the classification, four variables were used: dividends, sales growth, capital expenditure and age. They ranked firms on each of the four life cycle descriptors and grouped them into the life cycle stages through a scoring model. Zhipeng (2006) concerned with Anthony and Ramesh's approach in classifying firms, due to ranking them among all the firms every year. In fact, for example, for a company in a weak growth sector, a sales' growth of 5% may be high, but for another company in a high growth sector, this 5% of sales' growth might not be so positive.

A more recent study developed by Dickinson (2005), with a five life stages model (introductory, growth, maturity, shakeout and decline), the author used signs (positive or negative) of three types of cash flows (cash flows from operating, investing and financing activities) in each firm-year to classify firms in five stages. For example, a firm in the introductory stage should have negative operating cash flows, negative investing cash flows and positive financing cash flows. On the other hand, firms with positive operating cash flows, negative investing cash flows and negative financing cash flows should be in the growth stage. For Zhipeng (2006), like the study of Anthony and Ramesh (1992), the model of Dickinson (2005) has the disadvantage of being difficult to perform any time series analysis within each life cycle stage.

In addition to the review of other methodologies, Zhipeng (2006) purposed their methodology, which they mention that would help to avoid the lack of generality problem of studying only a few organizations, showing that it can be widely used for big samples, quantified as more than "thousands or even millions" if needed, especially in finance researches. However, this methodology only uses two classification variables (age and sales growth).

Recently, Dickinson (2011) developed another study in which were also identified 5 stages, but now with a different designation: birth, growth, maturity, decline and revival. For the classification of firms in life stages, the author focuses on operating, investing and financing cash flows. It should be noted that this study was firstly used in a capital structure article in a study developed by Castro et al. (2015), which defined as an advantage of this methodology the possibility to observe the differences by stage and the

usage of operating, investing and financing cash flows. By considering these three aspects of the business jointly, this method overcomes the partiality of using just one discriminant variable, which is a commonplace in the literature.

According to Gup and Agrrawal (1996), the life cycle of companies can present itself as a realistic and dynamic tool in the study of the financial policies adopted by the companies. It is certain that companies are born, grow and decline, renew and reappear, or may not survive and disappear (Kimberly et al., 1980). All businesses, throughout their development, have distinct phases, each with its own characteristics (Scott and Bruce, 1987). The concept that firms evolve through a financial life cycle is well identified in the literature (La Rocca et al., 2011). However, several studies have been developed both on the life cycle and on the capital structure, but there are few that explained how both issues are related.

2.3. Capital Structure and Life Cycle

In fact, capital structure's choice is likely to be influenced according to the phase where the company is in terms of life cycle, as financing needs may change with the changing circumstances of a firm (Damodaran, 2001).

From its initial phase to a more mature one, a company should use progressively more debt (Hovakimian et al., 2001). These financing preferences were analyzed in the same view by Damodaran (2001), stating that expanding and high-growth firms would use primarily equity, while mature firms would use debt instead.

La Rocca et al. (2011) also warned for the need of companies to look at the stages of life in which they are when they make financing decisions and strategies. This information relates to the fact that in their early stages, companies tend to have higher levels of information asymmetry, more opportunities for growth and a smaller size.

Berger and Udell (1998) wrote an article in which they show how capital structure varies with firm size and age. For them, as companies become older and larger, their characteristics and ambitious change.

In addition, the findings of the relation between capital structure and life stage can help better understanding how a firm financing changes over the time.

2.3.1. Empirical Evidence

As already mentioned, there was little research focusing directly on the relationship between capital structure and life cycle stage theories, but in the last years there have been some empirical evidence on the subject. Below we present some of the most important empirical studies' results.

Frielinghaus et al. (2005) study the relationship between capital structure and a firm's life stage for a sample of 81 South African private and public companies. They use the Adizes' life stage model (ten stages) to assess the life stage of the firms. They find a statistically significant relationship between life stage and capital structure. In addition, considering that there is more debt in the early and late life stages than in prime, they also argue that the nature of the relationship supports the Pecking Order Theory of capital structure. Moreover, in contrast with the static Trade-Off Theory, the Pecking Order Theory suggests a high-low-high of debt ratio over time.

Pinková and Kaminková (2011) investigate the impact of corporate life cycle on the capital structure of fifty medium-sized Czech automotive companies for a sample period between 2002 and 2010. In accordance, they classify firms on the basis of cash flow patterns proposed by Dickinson (2011). The findings suggest that both the development of debt-to-equity ratio and the development of current liabilities in different stages of corporate life cycle indicate the linkage between life cycle and capital structure. Furthermore, they considered that the Pecking Order Theory is related to the corporate life cycle issue, due to the funding behaviour of companies, which in the stages of birth and growth use typically more debt than equity. As for mature companies, the level of debt decreases, but it rises again in the decline stage. As so, they suggest a high-low-high pattern.

La Rocca et al (2011) explore the financing choices of small and medium-sized firms through the lens of the business life cycle through a sample of 10,242 Italian non-financial small and medium-sized firms, not involved in a bankruptcy process for a period from 1996 to 2005. Their results concluded that the Pecking Order Theory shows a higher degree of application.

Alves (2013) studies the capital structure decisions from a sample of 1905 small and medium enterprises located in Castelo Branco, Portugal, from 2005 to 2009, verifying if

the life cycle is a relevant explanatory determinant of capital structure for those companies. The author's findings point out that the capital structure decisions of SME's located in Castelo Branco follow the Pecking Order Theory.

Getzmann et al. (2014) analyze the speed of adjustment toward target capital structures for 1239 asian companies based on generalized method of moments estimations. His findings strong evidence that companies in Asia pursue target capital structures, as predicted by the Trade-Off Theory. He also shows that the convergence to target capital structures is consistent with international evidence, estimated at an annual adjustment speed of 24–45% of original leverage levels.

Castro et al. (2015) examine the effect of a firm's life cycle stages on the capital structure in tech versus non-tech firms using a wide sample of public companies from Europe. The authors used Dickinson's (2011) approach to measure life cycle stages, classifying firms into five life stages (introduction, growth, mature, shake-out and decline) according to their cash flow patterns. Although this study aims to compare capital structures throughout the life cycle of technological companies with non-tech firms, this study concluded that there was evidence in the relationship between the capital structure and the life cycle. Additionally, through the test of Pecking Order Theory, the lower use of debt of technological companies throughout their life cycle was confirmed.

Tian et al., 2015) use a panel data-fixed effect approach and data collected from Chinese public manufacturing firms between 1999 and 2011. They used Dickinson's (2011) approach to classify companies into five life stages (introduction, growth, mature, shake-out and decline) by cash flow patterns. They found that Chinese public manufacturing companies adjust their debt ratio at different speeds when they are in different life cycle stages. Specifically, the adjustment speed showed a U-shaped pattern over the life cycle, as follows: it is 68.52 (birth), 61.31 (growth), 26.91 (mature), 42.96 (revival) and 48.78 (decline) percent, respectively.

Ahsan et al. (2016) analyze, with a Fixed Effects Model, the adjustment rate made to target capital structures by a large amount of Pakistani listed non-financial firms with a sample period between 1972 and 2010. To classify firms into life cycle stages they chose the multivariate methodology (Anthony and Ramesh, 1992), using growth, mature and decline stages. They find a low-high-low leverage pattern during growth, maturity and

decline stages, in line with Trade-Off Theory. The study also observes different adjustment rates for the three stages, as follows: for growing firms, it was 47.9%, 49.3% and 37.9% for short-term leverage, long-term leverage and total leverage, respectively; for mature firms, it was 31.3%, 35.5% and 17.5% for short-term leverage, long-term leverage and total leverage, respectively; and for declining firms, it was 20.8%, 22.2% and 15.1% for short-term leverage, long-term leverage and total leverage, respectively.

Similar to Ahsan et al. (2016), but with a generalized method of moments model, Rehman et al. (2016) investigate how firms adjust their leverage policy across the firm's life cycle but they use a sample of 867 listed Chinese non-financial firms over the period from 1996 to 2014. For the effect, they followed Anthony and Ramesh (1992) and Ahsan et al. (2016), and categorized firms into three categories (growth, maturity and decline) and employed a dynamic panel data model to estimate adjustment rates in these three life stages. In addition, they also examined various multilevel determinants of leverage. The study finds a low-high-low pattern of leverage ratio across growth, maturity and decline stages for the Chinese firms, which enabled the conclusion that leverage policy is in accordance with the Trade-Off Theory. Moreover, the leverage adjustment rates vary for different life stages, as follows: for growing firms, it was 90.5%, 75.0% and 59.4% for short-term leverage, long-term leverage and total leverage, respectively; for mature firms, it was 78.0%, 43.5% and 28.6% for short-term leverage, long-term leverage and total leverage, respectively; and for declining firms, it was 64.0%, 54.1% and 26.8% for short-term leverage, long-term leverage and total leverage, respectively.

3. Hypotheses Development

Based on the theories and empirical evidences of previous studies, this chapter introduces our research hypotheses on firm leverage across its life cycle stages.

(i) Pecking Order Theory

According to recent studies (e.g. Ahsan et al., 2016; Rehman et al., 2016), in their earlier stages, firms have higher information asymmetry and lower profitability. In addition, growing firms usually improve their information gathering capability, but as their investment needs increase they do not retain or retain less earnings and they even raise more debt to face such needs. Regarding maturity stages, firms tend to have more retained earnings due to their lower investment needs and so they raise less debt than in growth stages. Consequently, mature companies tend to prefer equity financing and are also characterized to have less information asymmetry. As for decline stages, firms' profits decrease as the retained earnings, which leads to bigger motives to raise debt again.

Also Frielinghaus et al. (2005) and Teixeira and Santos (2006) observed that the Pecking Order Theory explains how firms tend to adopt specific financing strategies as they progress along their lives. The changes in the adverse selection costs and information asymmetry in the Pecking Order offer signs of a high-low-high general pattern in firms' leverage.

Hence, the Pecking Order Theory suggests a high-low-high financing pattern, since debt is high in growth stages, then reduces at maturity and rises again in decline stages. Therefore we hypothesize:

Hypothesis 1 (H1): There is a high-low-high pattern of leverage during firms' life stages.

(ii) Trade-Off Theory

Nevertheless, the static form of the Trade-Off Theory postulates that a firm defines an optimal level of leverage based on a trade-off between the associated benefits and the cost with alternative financing (in perfect markets). Nevertheless, the capital structure of a company is also influenced by other types of factors (endogenous and exogenous), which vary over time and certainly with the life stages of companies. Consequently, companies

adjust their capital structure by making their decisions dynamic (Fischer et al., 1989). Moreover, regardless of the life stage in which they are, in order to benefit from larger tax advantages, companies are attracted to borrow higher debt. But with certain limits, since if firms increase its debt too much, it increases bankruptcy and financial distress risk. Therefore, companies feel the need to balance between tax benefits and costs of bankruptcy. Moreover, Ahsan et al. (2016) and Rehman et al. (2016), who concluded that that leverage policy in their studies is in accordance with trade-off theory, mentioned in their studies that it is expected that bankruptcy chances are higher in growth and decline stages than in mature ones, which leads companies to use less debt at these stages. Therefore, even knowing that higher debt would mean higher tax benefits, in these stages firms should raise less debt.

So, it can be concluded that Trade-Off Theory suggests a low-high-low financing pattern as validated by Frielinghaus et al. (2005) and Teixeira and Santos (2006), since the use of debt is low in growth stages, then increases in maturity stages and reduces again in decline stages. Therefore we hypothesize:

Hypothesis 2 (H2): There is a low-high-low pattern of leverage during firms' life stages.

(iii) Agency Cost Theory

According to Ahsan et al. (2016) and Rehman et al. (2016), it is in the growth stage that firms will face more investment opportunities, which will create a greater willingness on the part of managers to consume the available cash flows, however, at this life stage, companies have fewer free cash flows, which leads them to raise more debt. Then, at maturity stages, firms have higher free cash flows, but less investment opportunities and so firms raise less debt. Finally, when firms are in decline, they raise debt because it acts as a control mechanism. In this regard, Agency Cost Theory suggests a high-low-high financing patterns. Therefore we hypothesize:

Hypothesis 3 (H3): There is a high-low-high pattern of leverage during firms' life stages.

(iv) Diamond's Theory

In agreement with Ahsan et al. (2016) and Rehman et al. (2016), we assume that firm's reputation can generate a low-high-high financing patterns, since the use of debt is low in growth stages and is high in maturity and in decline stages.

In fact, the findings of the Diamond (1989) conclude that reputation varies along firms' life stages, which helps to realize that their financing decisions also vary accordingly. Naturally, firms in growth stages have less history or past record and so have low reputation, meaning a lower credit capacity and information asymmetry and consequent lower debt attractiveness. As for maturity and decline stages, firms already have a solid history and so a lower information asymmetry, consistent with an increase in reputation in these stages. Therefore, mature and declining companies as they have higher reputation raise more debt. Therefore we hypothesize:

Hypothesis 4 (H4): There is a low-high-high pattern of leverage during firms' life stages.

Table 1: Leverage pattern across firm's life cycle as suggested by capital structure

Capital structure Theories	**Leverage pattern**		
	Growth	**Maturity**	**Decline**
Pecking Order Theory	High	Low	High
Trade-Off Theory	Low	High	Low
Agency Cost Theory	High	Low	High
Diamond's Theory	Low	High	High

Source: Ahsan et al. (2016) and Rehman et al. (2016)

The table above, based on the previous hypotheses, summarizes the inputs of each theory when approaching the relationship between capital structure and life cycle stages.

It should be yet noted that we exclude the Market Timing Theory, which was mentioned but not hypothesized in the studies of Ahsan et al. (2016) and Rehman et al. (2016), since it did not have its relationship with leverage defined in the table nor any hypothesis associated.

4. Data Description

For the empirical analysis we choose a sample of firms listed in the Euronext Lisbon and in the Madrid Stock Exchange. From this initial sample, we excluded i) financial firms, due to their balance sheet being affected by specific factors, such as industry rules and regulatory laws, ii) firms whose financial year is different from the civil year, in accordance with a recent study applied for a portuguese sample (Borges, 2016). In addition, we decided to exclude also companies that did not have financial information regarding the three life cycle classification variables for a minimum consecutive period of 3 years, because of reasons of consistency in the sample.

Initially, when the batch of companies was withdrawn from Thomson Reuters Eikon, we had 168 companies. After these adjustments, the sample is a panel of 117 firms over the period of 2001 to 2016. All data were taken from Thomson Reuters Eikon (database chosen for containing information at market value).

Next, we proceed by describing the methodology used to classify the firms in their life cycle stages. After that, we present the dependent and independent variables and their descriptive statistics.

4.1. Classification of firms in different life cycle stages

Regarding the classification of firms into life stages, we follow the multivariate methodology developed by Anthony and Ramesh (1992), which was also used in the studies of Ahsan et al. (2016) and Rehman et al. (2016). As mentioned, this methodology divides firms into three life stages which are growth, maturity and decline.

We choose a multivariate method, in accordance with Anthony and Ramesh (1992), over the univariate approach due to its higher reliability and given that its analysis avoid firm size effects, risk differences and measurement errors. In addition, there are various studies employing a multivariate procedure (Jenkins et al., 2004; Teixeira and Santos, 2006; Ahsan et al., 2016; Rehman et al., 2016).

The main variables used in this research method are the dividend payout ratio (dividend paid/net profit before tax), sales growth (firm's annual percentage change in revenues) and age (natural logarithm of number of years since a firm first traded).

The classification itself started by calculating the firms' dividend payout ratios and sales growth for each year, and then we measured the median values of these variables based on prior five years data.

Consequently, and describing the methodology applied, after calculating the 5-year median values of the variables abovementioned, we made three columns: age, 5-year median values of sales growth and 5-year median values of dividend payout ratio. Then, we made three thirds for the three variables.

After that, we classified firms according to a criteria based on three life cycle stages, as presented in the table below.

Table 2: Life cycle variables and classification method

Life cycle stages	**Dividend payout (DP)**	**Sales growth (SG)**	**Age (AGE)**
Growth	Low	High	Young
Mature	Medium	Medium	Adult
Decline	High	Low	Old

Source: Rehman et al. (2016) and Ahsan et al. (2016)

As showed: i) growing firms are characterized by lower dividend payout ratios, a high growth in sales and young age; ii) mature firms tend to increase their payout ratio and sales growth, as also age; and iii) declining firms present the highest payout ratios, become even more older, but reduce their growth in sales.

Afterwards, each firm-year observation is allocated to a group and scored (growth=1; mature=2; decline=3). Subsequently, the scores given for all three variables are summed, which means that the minimum value is 3 and the maximum is 9. In accordance with the sums, we classify the summed up scores according to the following thresholds:

- Firms in a growth stage: those which have a composite score lesser than or equal to 4 (first two intervals).
- Firms in a maturity stage: those which have a composite score between 5 and 7 (middle three intervals).
- Firms in a decline stage: those which have a composite score greater than or equal to 8 (last two intervals).

In the table below, we present the descriptive statistics of life cycle classification

variables.

Table 3: Descriptive statistics of firm's classification variables

Variable	Obs	Mean	Median	Maximum	Minimum	Std. Dev.
Panel A: Growth						
Median DP	235	0.047	0.027	0.302	-0.656	0.146
Median SG	235	-0.035	0.016	0.093	-1.875	0.185
Age	235	0.708	0.845	1.146	0.000	0.386
Panel B: Maturity						
Median DP	1029	0.221	0.238	5.878	-66.857	2.140
Median SG	1029	0.058	0.055	0.974	-3.391	0.199
Age	1029	0.995	1.146	1.415	0.000	0.396
Panel C: Decline						
Median DP	124	0.304	0.272	1.327	0.131	0.161
Median SG	124	0.146	0.140	0.305	0.095	0.043
Age	124	1.214	1.230	1.362	0.903	0.105

Note: Median DP is the median value of annual dividend paid over net profit before tax based on prior five-year data. Median SG is the median value of percentage change in annual sales based on prior five-year data; Age is natural logarithm of number of years since a firm is listed.

The above table presents the descriptive statistics of the three variables used to classify firms into growth, mature and decline stages. It should be noted that the calculation of median values for dividend payout ratio and sales growth based on five years' prior data, reduced our total number of firm-year observations from 1872 to 1388. As a result, Table 3 indicates that we have 235 firm-year observations for the growth stage; 1029 firm-year observations for the maturity stage and 124 firm-year observations for the decline stage.

4.2. Dependent Variable

The purpose of this research is to study the effects of firms' life cycle stages on their capital structure, thus the dependent variable will be the capital structure, or leverage. Its measurement is in accordance with financial leverage following the methodologies used in the empirical studies of Ahsan et al. (2016) and Rehman et al. (2016). Therefore, three proxies of leverage will be used, as follows:

- Short-Term Leverage (SL) which is the ratio of short-term loan to total assets;
- Long-Term Leverage (LT) that is the ratio of long-term loan to total assets; and
- Total Leverage (TL) meaning the ratio of total liabilities to total assets.

4.3. Independent Variables

Following very recent empirical studies (Ahsan et al., 2016; Rehman et al., 2016), we selected our explanatory variables and we shall now describe their proxies and relationship to capital structure. In addition, we will also describe their relationship to the leverage's adjustment rate.

Table 4: Summary table of control variables, their proxies and proposed relationship with leverage

Variable		**Notation**	**Measurement**	**Relationship with leverage**	**Relationship with adjustment rate**
Firm level	Tax shield	TS	Ratio of debt paid and gross profit	+	+
	Bankruptcy risk	ZS	Altman's z score	+/-	+
	Business risk	BR	Annual change in net profit	+/-	+/-
	Non-debt tax shield	NDTS	Ratio of depreciation to total assets	-	?
	Agency costs	AgC	Ratio of operating expense over sales	+	?
	Growth	GROW	Annual change in total assets	+/-	+
	Current profitability	CP	Net profit scaled by total assets	+/-	+
	Past profitability	PP	Retained earnings ratio	+/-	+
	Liquidity	LIQ	Ratio of current assets to current liabilities	+/-	+
	Tangibility	TAN	Ratio of net fixed assets to total assets	+	?
	Collateral value	CV	Ratio of gross fixed assets at cost to total assets	+	?
	Firm size	SIZE	Natural logarithm of firm's assets	+/-	+
Industry level	Industry leverage	ILEV	Mean of industry leverage	+	+
	Industry profitability	IP	Mean of industry profit	?	?
Country level	Inflation rate	INF	Annual inflation rate based on consumer prices	+	+

Variable		Notation	Measurement	Relationship with leverage	Relationship with adjustment rate
	Exchange rate	ER	Yearly exchange rate of eur to us dollar	?	+
	Economic growth	EG	Annual per capita GDP rate	+/-	+/-
	Capital formation	CF	Ratio of gross capital formation to GDP	?	?
Life cycle stages			Growth = 1; Mature = 2; Decline = 3		

It should be noted that in those studies it was showed that, based on Raian and Zingales (1995), Booth et al. (2001), and Jõeveer (2013) there are three categories of factors that clarify target leverage, which are firm, industry and macroeconomic factors. Also, these factors can also clarify adjustment rates toward target capital structure (Drobetza and Wanzenried, 2006; Tongkong, 2012; Getzmann et al., 2014). Our study will take into account this type of factors, on the basis of which managers of a firm set their target capital structure.

4.4. Descriptive Statistics

Table 5: Descriptive Statistics of dependent and independent variables in the three life cycle stages

	SL	LL	TL	TS	ZS	BR	NDTS	AgC	GROW	CP	PP	LIQ	TAN	CV	SIZE	ISL	ILL	ITL	IP	INF	ER	EG	CF
Growth stage																							
Obs	235	235	235	142	169	235	222	235	235	235	234	235	234	191	235	235	235	235	235	235	235	235	235
Mean	0.018	0.268	0.741	0.046	1.512	-0.056	0.033	0.945	-0.047	0.026	0.014	1.274	0.262	0.234	9.009	0.018	0.238	0.731	0.050	1.960	1.273	0.445	0.018
Median	0.000	0.251	0.718	0.036	1.297	0.143	0.030	0.926	0.001	0.025	0.068	1.038	0.227	0.060	8.901	0.016	0.233	0.680	0.030	2.446	1.458	1.370	0.000
Max	0.464	0.916	1.740	1.745	7.612	88.707	0.192	2.999	0.656	0.980	0.652	9.665	0.853	1.280	10.996	0.085	0.546	1.114	0.633	4.395	0.890	3.278	0.464
Min	0.000	0.000	0.065	-1.621	-2.683	-74.958	0.000	0.097	-1.678	-0.392	-1.625	0.094	0.001	0.000	7.379	0.000	0.020	0.522	-0.156	-0.836	0.137	-4.424	0.000
Std. Dev.	0.055	0.171	0.217	0.252	1.477	8.775	0.025	0.256	0.268	0.101	0.321	1.117	0.217	0.320	0.764	0.016	0.062	0.119	0.105	1.495	1.273	2.078	0.055
Mature stage																							
Obs	1025	1026	1026	711	918	1026	1001	1026	1026	1026	1018	1026	1026	945	1026	1029	1029	1029	1029	1029	1029	1029	1029
Mean	0.020	0.237	0.740	0.076	3.026	0.319	0.038	0.875	-0.024	0.059	0.051	1.532	0.296	0.435	9.201	0.020	0.240	0.240	0.052	1.802	1.268	0.321	-1.315
Median	0.000	0.231	0.707	0.031	1.428	0.074	0.033	0.912	0.022	0.037	0.140	1.117	0.272	0.245	9.133	0.016	0.233	0.233	0.030	2.356	1.319	1.338	-0.016
Max	0.579	0.863	21.169	10.015	717.345	460.022	0.255	10.826	0.974	27.276	4.680	58.682	0.920	3.869	11.126	0.222	0.546	0.546	0.633	4.395	1.458	3.282	7.757
Min	0.000	0.000	0.012	-0.715	-90.992	-130.737	0.000	-18.834	-40.928	-2.244	-50.030	0.035	-0.613	0.000	6.397	0.000	0.036	0.036	-0.356	-0.836	0.890	-4.424	-18.107
Std. Dev.	0.061	0.160	0.853	0.434	29.407	16.401	0.030	1.065	1.329	0.860	2.142	3.487	0.220	0.481	0.857	0.024	0.067	0.067	0.121	1.590	0.140	2.206	7.372
Decline stages																							
Obs	124	124	124	93	122	124	123	124	124	124	123	124	124	109	124	124	124	124	124	124	124	124	124
Mean	0.019	0.236	0.730	0.048	1.735	0.192	0.031	0.898	0.052	0.048	0.160	1.053	0.333	0.510	9.710	0.016	0.250	0.743	0.038	2.115	1.343	-0.484	-3.332
Median	0.000	0.223	0.744	0.038	1.375	0.037	0.031	0.914	0.056	0.050	0.152	1.072	0.273	0.446	9.630	0.013	0.236	0.713	0.040	2.595	1.337	-0.446	-3.761
Max	0.540	0.604	0.935	0.181	9.358	23.958	0.161	1.477	0.585	0.165	0.557	2.371	0.908	1.370	10.987	0.221	0.392	1.114	0.633	4.076	1.458	3.278	7.757
Min	0.000	0.000	0.203	0.001	0.373	-2.835	0.005	0.514	-0.878	-0.153	-0.531	0.304	0.017	0.003	8.335	0.000	0.108	0.571	-0.156	-0.836	1.050	-4.424	-18.107
Std. Dev.	0.061	0.152	0.131	0.044	1.128	2.352	0.020	0.119	0.204	0.049	0.157	0.386	0.215	0.368	0.720	0.022	0.060	0.101	0.063	1.493	0.095	2.333	8.273

Note: The above table presents the descriptive statistics of dependent and independent variables used in this study during growth, mature and decline stages. $ISL_{j,t}$ is the mean industry short-term leverage; $ILL_{j,t}$ is mean industry long-term leverage; $ITL_{j,t}$ is mean industry total leverage. The remaining variables were descripted above (in sections 4.2 and 4.3).

Table 5 shows the summary statistics we computed for the variables used in our analysis. The mean values of SL and LL enable us to conclude that Portuguese companies opt for long-term leverage rather than short-term leverage. TL has the highest mean variable out of the three variables and it have its highest value in growth stage. It is also noted that on what concerns LL and TL, as companies evolve from life stage they tend to decrease their leverage, with the exception of SL.

The mean value for SL is 0.018 during growth, 0.020 during maturity and 0.019 during decline stage, which means a low-high-low pattern of total leverage (TL), being in line with the Trade-Off Theory of capital structure, confirmiming the hypothesis 2.

The mean value for LL is 0.268 during growth, 0.237 during maturity and 0.236 during decline stage, which means a high-low-low pattern of total leverage (TL), which does not correspond to any theory of capital structure, rejecting all of our hypothesis.

The mean value for TL is 0.741 during growth, 0.740 during maturity and 0.730 during decline stage, which means a high-low-low pattern of total leverage (TL), which does not correspond to any theory of capital structure, rejecting all of our hypothesis.

The mean values of PP, TAN, CV, SIZE increase along the three phases. The mean value for AgC is higher during growth stage (0.945). In the opposite direction, GROW present its highest mean value in the decline stages (0.052). As for the variables TS, ZS, BR, NDTS, LIQ and CP, their mean value presents a low-high-low pattern, which is in line with the Trade-Off Theory of the capital structure.

The ISL means (0.018 during the growth stage, 0.020 during the mature stage and 0.016 during the decline stage) and the ILL ones (0.238 during the growth stage, 0.240 during the mature stage and 0.250 during the decline stage) also suggest that Portuguese firms rely heavily on long-term debt throughout their life cycles as their main financing way indicate. The ITL means (0.731 during the growth stage, 0.240 during the mature stage and 0.743 during the decline stage) suggest a low-high-low pattern consistent with the Pecking Order Theory and with Agency Cost Theory.

The variables INF and ER appear to influence the leverage negatively, since when they reach the highest values (decline stages), leverage reaches the lowest. In the opposite direction are the variables EG and CF that present higher values in the growth stage, similar to leverage.

5. Empirical model

The objective of our study is to analyze the effects of capital structure determinants' across three life cycle stages and to find out the variations in the leverage adjustment rate during those life-cycle stages. Accordingly, we used a sample of 117 Iberian non-financial listed firms in the 2001-2016 period using panel data methodology.

According to Wooldridge (2015), the panel data method is used when data has cross-sectional and time series dimensions, thus, when it can be observed that the behaviour of individuals vary across time. One of the great advantages of this method is that panel datasets allow not only for the observation of the variables' behaviour over time, but also for the control of omitted variables.

Nevertheless, there are various methods dealing with panel data and the most used are Pooled OLS, the Fixed Effects and the Random Effects Models. We will test each one and decide on which is the most suitable to apply in our model.

Our baseline model to determine leverage ratios (short-term leverage, long-term leverage and total leverage) explained by its determinants, was based on recent similar studies (Ahsan, 2016; Rehman et al., 2016), as follows:

$$\begin{aligned} LEV_{i,t} = \beta_0 + {} & \beta_1 TS_{i,t} + \beta_2 ZS_{i,t} + \beta_3 BR_{i,t} + \beta_4 NDTS_{i,t} + \beta_5 AgC_{i,t} + \beta_6 GROW_{i,t} + \beta_7 CP_{i,t} \\ & + \beta_8 PP_{i,t} + \beta_9 LIQ_{i,t} + \beta_{10} TAN_{i,t} + \beta_{11} CV_{i,t} + \beta_{12} SIZE_{i,t} + \beta_{13} ILEV_{i,t} \\ & + \beta_{14} IP_{i,t} + \beta_{15} INF_{i,t} + \beta_{16} ER_{i,t} + \beta_{17} EG_t + \beta_{18} CF_{i,t} \\ & + \mu_{i,t} \end{aligned} \quad (5.1)$$

Where LEV is one of the three measures of leverage (i.e. short-term leverage - $SL_{i,t}$ -, long-term leverage – $LL_{i,t}$ - and total leverage - $TL_{i,t}$) - for the *i*th firm at time *t*, $\beta 0$ is constant term. Furthermore, $TS_{i,t}$ is the ratio of tax payments over gross profit; $ZS_{i,t}$ is Altman's Z-score. $BR_{i,t}$ represents business risk of a firm *i* at time *t*. $NDTS_{i,t}$ is non-debt tax shield of a firm *i* at time *t*. $AgC_{i,t}$ represents agency costs of a firm *i* at time *t*. $GROW_{i,t}$ is the annual growth rate of a firm *i* at time *t*. $CP_{i,t}$ represents current profit of a firm *i* at time *t* while $PP_{i,t}$ is past profits of a firm *i* at time *t*. $LIQ_{i,t}$ represents liquidity of a firm *i* at time *t*. $TAN_{i,t}$ represents the tangibility ratio of a firm *i* at time *t*. $CV_{i,t}$ is the ratio of fixed assets at cost over total assets $SIZE_{i,t}$ is the firm *i*'s size at time *t*. $ILEV_{i,t}$ is one of the three measures of industry leverage (i.e. industry short-term leverage - $ISL_{i,t}$ -, industry long-term leverage - $ITL_{i,t}$ - and industry total leverage – $ITL_{i,t}$ - for the *i*th firm

at time *t*. $IP_{j,t}$ is the industry mean profit of an industry *j* at time *t*. INF_t represents inflation rate at time *t*. ER_t is exchange rate at time *t*. EG_t represents economic growth at time *t*. CF_t is capital formation ratio to total GDP at time *t*. μ_{it} is the error component for *i*th firm at time *t*.

Based on the references of Fischer et al. (1989) and Myers (1984), Tian et al. (2015), Rehman et al. (2016), Ahsan et al. (2016) suggested that firms continuously strive toward their dynamic optimal target leverage, but at the same time, adjustment costs deviate the firms away from their target leverage and slow down their adjustment rates. Consequently, firms may adjust their actual leverage partially toward the target leverage. As so, if these costs were absent, firms would adjust their capital structure immediately, but if they are infinitely no adjustment would be noted (Brunaldi et al., 2015). Therefore, in order to estimate the rate of adjustment of leverage, we applied another equation:

$$LEV_{i,t} - LEV_{i,t-1} = \gamma(LEV^*_{i,t} - LEV_{i,t-1}) \quad (5.2)$$

What is the same as:

$$LEV_{i,t} = (1-\gamma)LEV_{i,t-1} + \gamma LEV^*_{i,t} \quad (5.3)$$

where $LEV^*_{i,t}$ is the target leverage, If $\gamma = 1$; means full adjustment has been achieved by the firm within one accounting period.

It is important to mention that $LEV^*_{i,t}$ is a vector variable (one that is not observed but whose value is calculated from other variables). Accordingly, we assume that managers of a firm set their target capital structure a year before, which leads $LEV^*_{i,t}$ to be measured by one year lag of determinants of capital structure (mentioned in the first equation above).

The leverage adjustment rate depends on the adjustment cost, which itself depends on the determinants of the target capital structure of a firm. Thus, by replacing this rationale in equation 5.1, we get the following equation:

$$\begin{aligned} LEV_{i,t} = {} & \beta_0\gamma + (1-\gamma)LEV_{i,t-1} + \gamma\beta_1 TS_{i,t-1} + \gamma\beta_2 ZS_{i,t-1} + \gamma\beta_3 BR_{i,t-1} + \gamma\beta_4 NDTS_{i,t-1} \\ & + \gamma\beta_5 AgC_{i,t-1} + \gamma\beta_6 GROW_{i,t-1} + \gamma\beta_7 CP_{i,t-1} + \gamma\beta_8 PP_{i,t-1} + \gamma\beta_9 LIQ_{i,t-1} \\ & + \gamma\beta_{10} TAN_{i,t-1} + \gamma\beta_{11} CV_{i,t-1} + \gamma\beta_{12} SIZE_{i,t-1} + \gamma\beta_{13} ILEV_{i,t-1} \\ & + \gamma\beta_{14} IP_{i,t-1} + \gamma\beta_{15} INF_{i,t-1} + \gamma\beta_{16} ER_{i,t-1} + \gamma\beta_{17} EG_{t-1} + \gamma\beta_{18} CF_{i,t-1} \\ & + \mu_{i,t} \end{aligned}$$

Where γ is a partial adjustment parameter; $(1 - \gamma)$ is the adjustment rate. Hence, 1 - coefficient of $LEV_{i,t-1}$ is the leverage adjustment rate.

Moreover, in order to determine the adjustment rate during different life-cycle stages, and as advised by Ahsan, we created a categorical value (growth=1; maturity=2; decline=3) and estimated equation 5.4 across the three firm life cycle stages.

This last equation is the one we use to test our econometric model and our hypotheses (described in chapter 3) to be applied in the section 5.2 considering the leverage adjustment rate and the firm life cycle stages.

To estimate the leverage adjustment rate, Getzmann et al. (2014) and Rehman et al. (2016) used GMM's method. However, we followed Ahsan et al. (2016) and, hence, we estimated equation 5.4, using a Fixed Effects Model.

5.1. Correlation matrix and VIF test

Table 6: Correlation matrix and VIF test for short-term leverage

	$TS_{i,t-1}$	$ZS_{i,t-1}$	$BR_{i,t-1}$	$NDTS_{i,t-1}$	$AgC_{i,t-1}$	$GROW_{i,t-1}$	$CP_{i,t-1}$	$PP_{i,t-1}$	$LIQ_{i,t-1}$	$TAN_{i,t-1}$	$SIZE_{i,t-1}$	$CV_{i,t-1}$	$ISL_{i,t-1}$	$IP_{i,t-1}$	$INF_{i,t-1}$	$ER_{i,t-1}$	$EG_{i,t-1}$	$CF_{i,t-1}$	VIF
$TS_{i,t-1}$	1																		1.071
$ZS_{i,t-1}$	-0.038	1																	**17.384**
$BR_{i,t-1}$	0.014	0.029	1																1.015
$NDTS_{i,t-1}$	-0.081	-0.221	-0.058	1															1.690
$AGC_{i,t-1}$	0.297	-0.143	0.014	-0.089	1														1.172
$GROW_{i,t-1}$	-0.014	0.731	0.006	-0.302	-0.139	1													**41.427**
$CP_{i,t-1}$	-0.014	-0.358	-0.002	0.200	-0.013	0.028	1												**13.021**
$PP_{i,t-1}$	-0.010	0.964	0.034	-0.300	-0.112	0.745	-0.396	1											**83.214**
$LIQ_{i,t-1}$	-0.018	0.060	0.028	-0.101	-0.003	0.034	-0.017	0.047	1										1.055
$TAN_{i,t-1}$	-0.083	0.023	-0.020	0.343	-0.135	0.009	-0.024	0.052	-0.083	1									2.525
$CV_{i,t-1}$	-0.082	-0.263	-0.037	0.381	-0.034	-0.285	0.095	-0.293	-0.050	0.662	1								2.574
$SIZE_{i,t-1}$	-0.002	0.106	-0.012	-0.055	-0.172	0.127	-0.122	0.194	-0.139	0.060	-0.093	1							1.288
$ISL_{i,t-1}$	-0.026	0.057	-0.006	0.210	-0.027	0.002	-0.011	0.018	-0.004	-0.042	0.014	-0.055	1						1.258
$IP_{i,t-1}$	-0.033	-0.035	-0.002	0.086	-0.042	0.006	0.192	-0.065	0.027	0.072	0.160	-0.092	-0.066	1					1.272
$INF_{i,t-1}$	0.046	0.100	0.052	0.012	-0.050	0.052	-0.041	0.067	-0.068	0.040	-0.044	0.026	0.023	-0.200	1				1.269
$ER_{i,t-1}$	0.007	0.045	-0.023	-0.047	-0.002	-0.014	-0.036	0.040	-0.025	-0.056	-0.042	-0.001	0.190	-0.177	0.144	1			1.498
$EG_{i,t-1}$	0.019	-0.008	0.020	0.011	-0.123	0.050	0.046	-0.021	0.042	0.013	0.013	0.030	-0.147	0.254	0.150	-0.495	1		**22.561**
$CF_{i,t-1}$	0.027	-0.005	0.032	0.004	-0.119	0.044	0.052	-0.020	0.049	0.013	0.050	0.041	-0.145	0.285	0.166	-0.448	0.973	1	**22.238**

Table 7: Correlation matrix and VIF test for long-term leverage

	$TS_{i,t-1}$	$ZS_{i,t-1}$	$BR_{i,t-1}$	$NDTS_{i,t-1}$	$AgC_{i,t-1}$	$GROW_{i,t-1}$	$CP_{i,t-1}$	$PP_{i,t-1}$	$LIQ_{i,t-1}$	$TAN_{i,t-1}$	$SIZE_{i,t-1}$	$CV_{i,t-1}$	$ISL_{i,t-1}$	$IP_{i,t-1}$	$INF_{i,t-1}$	$ER_{i,t-1}$	$EG_{i,t-1}$	$CF_{i,t-1}$	VIF
$TS_{i,t-1}$	1																		1.074
$ZS_{i,t-1}$	-0.038	1																	**18.536**
$BR_{i,t-1}$	0.014	0.029	1																1.016
$NDTS_{i,t-1}$	-0.081	-0.221	-0.058	1															1.569
$AGC_{i,t-1}$	0.297	-0.143	0.014	-0.089	1														1.182
$GROW_{i,t-1}$	-0.014	0.731	0.006	-0.302	-0.139	1													**41.968**
$CP_{i,t-1}$	-0.014	-0.358	-0.002	0.200	-0.013	0.028	1												**13.252**
$PP_{i,t-1}$	-0.010	0.964	0.034	-0.300	-0.112	0.745	-0.396	1											**83.072**
$LIQ_{i,t-1}$	-0.018	0.060	0.028	-0.101	-0.003	0.034	-0.017	0.047	1										1.082
$TAN_{i,t-1}$	-0.083	0.023	-0.020	0.343	-0.135	0.009	-0.024	0.052	-0.083	1									2.561
$CV_{i,t-1}$	-0.082	-0.263	-0.037	0.381	-0.034	-0.285	0.095	-0.293	-0.050	0.662	1								2.594
$SIZE_{i,t-1}$	-0.002	0.106	-0.012	-0.055	-0.172	0.127	-0.122	0.194	-0.139	0.060	-0.093	1							1.420
$ISL_{i,t-1}$	0.067	-0.071	-0.054	-0.060	0.023	-0.015	-0.022	-0.012	0.115	-0.085	-0.109	0.138	1						1.345
$IP_{i,t-1}$	-0.033	-0.035	-0.002	0.086	-0.042	0.006	0.192	-0.065	0.027	0.072	0.160	-0.092	-0.131	1					1.281
$INF_{i,t-1}$	0.046	0.100	0.052	0.012	-0.050	0.052	-0.041	0.067	-0.068	0.040	-0.044	0.026	-0.160	-0.200	1				1.298
$ER_{i,t-1}$	0.007	0.045	-0.023	-0.047	-0.002	-0.014	-0.036	0.040	-0.025	-0.056	-0.042	-0.001	0.134	-0.177	0.144	1			1.485
$EG_{i,t-1}$	0.019	-0.008	0.020	0.011	-0.123	0.050	0.046	-0.021	0.042	0.013	0.013	0.030	-0.155	0.254	0.150	-0.495	1		**22.543**
$CF_{i,t-1}$	0.027	-0.005	0.032	0.004	-0.119	0.044	0.052	-0.020	0.049	0.013	0.050	0.041	-0.167	0.285	0.166	-0.448	0.973	1	**22.171**

Table 8: Correlation matrix and VIF test for total leverage

Correlation	$TS_{i,t-1}$	$ZS_{i,t-1}$	$BR_{i,t-1}$	$NDTS_{i,t-1}$	$AgC_{i,t-1}$	$GROW_{i,t-1}$	$CP_{i,t-1}$	$PP_{i,t-1}$	$LIQ_{i,t-1}$	$TAN_{i,t-1}$	$SIZE_{i,t-1}$	$CV_{i,t-1}$	$ISL_{i,t-1}$	$IP_{i,t-1}$	$INF_{i,t-1}$	$ER_{i,t-1}$	$EG_{i,t-1}$	$CF_{i,t-1}$	VIF
$TS_{i,t-1}$	1																		1.073
$ZS_{i,t-1}$	-0.038	1																	**20.778**
$BR_{i,t-1}$	0.014	0.029	1																1.022
$NDTS_{i,t-1}$	-0.081	-0.221	-0.058	1															1.583
$AgC_{i,t-1}$	0.297	-0.143	0.014	-0.089	1														1.178
$GROW_{i,t-1}$	-0.014	0.731	0.006	-0.302	-0.139	1													**41.544**
$CP_{i,t-1}$	-0.014	-0.358	-0.002	0.200	-0.013	0.028	1												**13.287**
$PP_{i,t-1}$	-0.010	0.964	0.034	-0.300	-0.112	0.745	-0.396	1											**136.600**
$LIQ_{i,t-1}$	-0.018	0.060	0.028	-0.101	-0.003	0.034	-0.017	0.047	1										1.064
$TAN_{i,t-1}$	-0.083	0.023	-0.020	0.343	-0.135	0.009	-0.024	0.052	-0.083	1									2.535
$CV_{i,t-1}$	-0.082	-0.263	-0.037	0.381	-0.034	-0.285	0.095	-0.293	-0.050	0.662	1								2.562
$SIZE_{i,t-1}$	-0.002	0.106	-0.012	-0.055	-0.172	0.127	-0.122	0.194	-0.139	0.060	-0.093	1							1.386
$ISL_{i,t-1}$	0.072	-0.185	-0.042	-0.161	0.154	-0.132	0.026	-0.146	0.033	-0.168	-0.024	0.028	1						1.259
$IP_{i,t-1}$	-0.033	-0.035	-0.002	0.086	-0.042	0.006	0.192	-0.065	0.027	0.072	0.160	-0.092	0.156	1					1.293
$INF_{i,t-1}$	0.046	0.100	0.052	0.012	-0.050	0.052	-0.041	0.067	-0.068	0.040	-0.044	0.026	-0.296	-0.200	1				1.337
$ER_{i,t-1}$	0.007	0.045	-0.023	-0.047	-0.002	-0.014	-0.036	0.040	-0.025	-0.056	-0.042	-0.001	-0.079	-0.177	0.144	1			1.465
$EG_{i,t-1}$	0.019	-0.008	0.020	0.011	-0.123	0.050	0.046	-0.021	0.042	0.013	0.013	0.030	-0.003	0.254	0.150	-0.495	1		**22.616**
$CF_{i,t-1}$	0.027	-0.005	0.032	0.004	-0.119	0.044	0.052	-0.020	0.049	0.013	0.050	0.041	0.012	0.285	0.166	-0.448	0.973	1	**22.233**

Note: All variables are lagged.

Tables 6-8 present the correlation matrices and VIF test for short-term, long-term and total leverage.

Before empirically testing our models, we decided to carry out a correlation analysis for our explanatory variables according to the three proxies for leverage (short-term leverage, long-term leverage and total leverage) and also a multi-collinearity analysis to ensure that our data did not face any multi-collinearity issues.

In what concerns the correlation results, it should be noted that the signs presented in the tables above should only be considered as preliminary results, since they are just considering the impact of one variable at each time in the leverage.

However, looking at the results presented, and considering as high correlations the ones which present a value higher than 0.5, we will be more careful when analysing them in the estimation outputs, because they can induce to lower significance levels.

Hence, we highlight strong correlations in the three proxies for leverage among ZS and GROW, ZS and PP, GROW and PP, TAN and CV and EG and CF.

Complementing this analysis, we found variables that had a VIF greater than 10 which we decided, in accordance with Ahsan et al. (2016), to exclude them from our analysis. Hence, we excluded ZS, GROW, CP, PP, EG and CF from our model. For the other variables, as showed in the tables, there were not any multi-collinearity problem.

Moreover, we did the VIF test for the three proxies for leverage and for the three life cycle stages (total of 9 models) and the results lead us to exclude two more variables. Specifically, the test made for the three proxies for leverage in the decline stage showed a VIF greater than 10 for the variables CV and TAN, which were then removed from the equations tested in that stage.

5.2. Empirical Results and analysis

The present section addresses the results of the estimated regressions, with which we analyze the adjustment rate for all the three proxies for leverage during all three life cycle stages. We will also approach the relation with the explanatory variables of our model.

The first step is to define which of the panel data methods is the most suitable for our model (using equation 5.4). Hence, we did the F-test and the Hausman test.

Table 9: F-test and Hausman Test

Equation	F-test	Level of confidence	Hausman test
Short-term leverage ($SL_{i,t}$) in growth stage	7.453	99.9%	84.295***
Long-term leverage ($LL_{i,t}$) in growth stage	2.453	99.9%	49.627***
Total leverage ($TL_{i,t}$) in growth stage	0.943	-	11.090
Short-term leverage ($SL_{i,t}$) in maturity stage	1.636	99.9%	74.154***
Long-term leverage ($LL_{i,t}$) in maturity stage	1.928	99.9%	120.417***
Total leverage ($TL_{i,t}$) in maturity stage	2.036	99.9%	141.626***
Short-term leverage ($SL_{i,t}$) in decline stage	1.954	-	38.014***
Long-term leverage ($LL_{i,t}$) in decline stage	3.795	99.9%	78.210***
Total leverage ($TL_{i,t}$) in decline stage	3.278	99.9%	37.471***

As so, we started with an F-test to decide among Fixed Effects and Pooled OLS, to see whether the observed and unobserved Fixed Effects are equal to zero. Firstly, we calculated the the F-critical for all proxies for leverage for all three life stages. In accordance with table 9, only the equations that regressed total leverage in growth stage and short-term leverage in decline stage did not reject the null hypothesis. The remaining equations rejected the null hypothesis, showing that pooled OLS is not the most appropriate model.

After that, we carried out the Hausman specification test to decide between Fixed Effects and Random Effects. From table 9, we conclude that the p-values were significant for all models with exception for total leverage in growth stage, leading us to reject the null hypothesis (which states that no correlation exists between the unique companies errors and the regressors in the model) for eight equations and concluding that Fixed Effects was the most indicated method.

Consequently, and according to the results presented above, we will use the Fixed Effects Model for all equations for consistency purposes.

Table 10: Estimation output of equation (4.3) during different life cycle stages

	SL			LL			TL		
	Growth	Maturity	Decline	Growth	Maturity	Decline	Growth	Maturity	Decline
Adjustment rate (%)	0.739	0.542	n.a.	0.722	0.517	n.a.	0.299	0.303	0.716
constant	0.039	0.079	-1.390	-0.467	-0.147	-0.957 *	-0.981	5.873	0.757 *
	(0.106)	(0.116)	(0.987)	(1.16)	(0.194)	(0.538)	(1.986)	(3.857)	(0.428)
$LEV_{i,t-1}$	0.261	0.458 ***	-0.329	0.278 *	0.483 ***	-0.203	0.701 *	0.697 ***	0.284 *
	(0.219)	(0.112)	(0.601)	(0.164)	(0.069)	(0.150)	(0.385)	(0.148)	(0.144)
$TS_{i,t-1}$	-0.001	-0.005	0.015	-0.004	0.027 *	0.159	-0.009	-0.009	0.128
	(0.000)	(0.007)	(0.131)	(0.005)	(0.016)	(0.239)	(0.006)	(0.043)	(0.087)
$BR_{i,t-1}$	0.000	0.000	0.007	-0.001	0.000	0.003	0.001	0.000	0.003
	(0.000)	(0.000)	(0.008)	(0.001)	(0.000)	(0.008)	(0.001)	(0.000)	(0.006)
$NDTS_{i,t-1}$	0.126	-0.047	1.185	-3.416	-0.097	-3.674	-0.574	2.617	-0.823
	(0.139)	(0.215)	(1.922)	(2.458)	(0.295)	(2.362)	(4.433)	(1.731)	(0.946)
$AgC_{i,t-1}$	0.000	0.001	0.759 **	0.075 *	0.045 ***	0.370	0.120 *	0.033	0.047
	(0.003)	(0.004)	(0.343)	(0.042)	(0.016)	(0.242)	(0.060)	(0.037)	(0.218)
$LIQ_{i,t-1}$	0.002	0.000	0.000	0.004	0.004 **	0.094 *	0.006	0.003	0.010
	(0.002)	(0.000)	(0.029)	(0.020)	(0.002)	(0.052)	(0.023)	(0.003)	(0.036)
$TAN_{i,t-1}$	0.017	-0.023	-	0.379	0.094	-	-0.054	0.450	-
	(0.018)	(0.025)	-	(0.236)	(0.088)	-	(0.347)	(0.302)	-
$CV_{i,t-1}$	-0.008	0.001	-	-0.449 ***	-0.049	-	-0.194	-0.976	-
	(0.016)	(0.01)	-	(0.085)	(0.039)	-	(0.117)	(0.610)	-
$SIZE_{i,t-1}$	-0.007	-0.008	0.068	0.007	0.032	0.134 **	0.149	-0.594	-0.019
	(0.012)	(0.011)	(0.067)	(0.126)	(0.022)	(0.053)	(0.223)	(0.404)	(0.035)
$ILEV_{i,t-1}$	-0.126	0.186	0.636	0.949 **	-0.092	-0.344	-0.165	0.119	-0.013
	(0.12)	(0.133)	(0.807)	(0.426)	(0.133)	(0.352)	(0.204)	(0.105)	(0.081)
$IP_{i,t-1}$	0.031 ***	-0.002	-0.037	0.079	0.039 ***	-0.025	-0.077	0.288 ***	-0.034
	(0.008)	(0.007)	(0.049)	(0.053)	(0.012)	(0.063)	(0.101)	(0.051)	(0.043)
$INF_{i,t-1}$	0.001	0.001	-0.001	0.015	0.002	0.007 **	-0.001	-0.015	-0.001
	(0.001)	(0.001)	(0.002)	(0.013)	(0.002)	(0.003)	(0.009)	(0.013)	(0.003)
$ER_{i,t-1}$	0.017	0.006	0.040	0.287 ***	-0.035 *	-0.238 *	-0.063	-0.059	-0.057
	(0.014)	(0.018)	(0.060)	(0.124)	(0.019)	(0.136)	(0.136)	(0.111)	(0.091)
R-squared	0.983	0.636	0.802	0.882	0.789	0.909	0.866	0.887	0.959
Adjusted R-squared	0.966	0.559	0.673	0.765	0.745	0.850	0.732	0.864	0.932
Obs	91	589	87	91	589	87	91	589	87
F-statistic	58.475 ***	8.311 ***	6.212 ***	7.502 ***	17.841 ***	15.336 ***	6.449 ***	37.532 ***	35.489

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Table 10 presents the estimates of the parameters in nine equations (for the three life cycle stages: growth, maturity and decline) for all the three dependent variables with Fixed Effects with the one year lagged explanatory variables.

These models include control variables that are constant among companies but that evolve over time and that capture the influence of aggregate time-series trends. It should also be noted that we regress our empirical model with Fixed Effects using white's standard errors clustered by firm robust to heteroskedasticity and serial correlation within the cluster.

The model presented 91 observations in the growth stage, 589 in the maturity stage and 91 in the decline stage. Our models for SL, LL and TL explained between 62%-98%, 79%-88% and 86%-96% respectively of the leverage variations across the three life cycle stages.

The low number of observations presented in the growth and decline stages lead to the low statistical significance observed in the models. However, for the equations regressed for maturity stages, the level of significance increased.

Additionally, the p-values of the global significance test of the models validate the high reliability and the accuracy of the independent variables in explaining the dependent variable.

5.2.1. Leverage adjustment rates

The coefficients of the lagged total leverage for all three stages were statistically significant, indicating the existence of target leverage for non-financial Iberian listed companies during their growth, maturity and decline stages. The results presented for total leverage suggest that Iberian firms partially adjust their target total leverages and try to bring their actual leverage closer to the target leverage they have defined. However for the other two proxies for leverage (SL and LL), not all the estimated coefficients were statistically significant.

For the lagged long-term leverage, firms in decline stages are going away from their target long-term leverage, as it was not possible to found a leverage adjustment rate as indicated by Ahsan. The same occurred with the lagged short-term leverage, for which firms in decline stages are also not following a target short-term leverage. These results were not in accordance with prior literature. One possible explanation for the nonexistence of leverage adjustment rates in decline stages for short-term and long-term leverages, but existing for total leverage, might be the fact that companies in decline stages are adjusting their capital structure focusing more in the medium term debt, which data is only being considered in the total leverage.

Furthermore, in what regards the growth and mature stages (for short- and long-term proxies for leverage), companies follow a target capital structure. In this sense, the adjustment rates for short-term leverage were 74% (growth) and 54% (maturity), while for long-term leverage were 72% (growth) and 52% (maturity).

Growing firms presented an adjustment rate of 74%, 72% and 30% for SL, LL and TL respectively. For mature firms, the adjustment rate was 54%, 52% and 30%. However, the negative coefficient estimated for lagged SL and lagged LL in the decline stages indicates that in decline stage firms do not have a target leverage, as already explained above.

For the short-term leverage and long-term leverage, growing firms have the highest adjustment rates, what can be explained by the fact that companies in their earlier stages need more financing to face their needs and investment opportunities. This is in accordance with the studies of Ahsan et al. (2016) and Rehman et al. (2016).

As for total leverage, decline firms present the highest adjustment rates, while growing firms have the lowest adjustment rates, probably reflecting that more experienced companies have a greater ability to change their capital structure and adapt to market trends.

5.2.2. Capital structure's determinants

CV and TAN were then excluded from the equations estimated only for decline stages due to their high VIF (higher than 10), so in decline stages these variables were not included.

BR, NDTS and TAN had no statistical significance in any of the models, reason why they were not target of a specific analysis

In line with TOT, we found a positive relationship between TS and long-term leverage in maturity stages. This suggests that mature firms should raise more debt to increase tax shield benefits.

Also in line with TOT, but without any statistical significance, BR showed a positive relationship with all the three proxies for leverage in the three life stages, with exception for the long-term leverage in the growth stage.

The results for the AgC variable were consistent with our expectations, being statistically significant and positive in equations for SL in the decline stage, for LL in the growth and maturity stages and for TL in the growth stage. It induces that firms try to reduce their agency conflicts by raising debt and so reducing the available free cash flows to discipline the spending behavior of managers as mentioned in the Trade-off Theory.

The variable LIQ, for which positive and negative signals were expected, showed only positive signals and these were statistically significant in the equations for LL in the maturity and decline stages. Consistent with the Pecking Order Theory, we identify a positive relationship with liquidity along all life stages.

Unlike expected, the variable CV presented as its only statistically significant coefficient a negative sign (for long-term leverage in the growth stages).

The variable SIZE presents, as expected in table 4, positive and negative signals, but the only statistically significant coefficient that presents is positive and is observed in the equation of LL in the decline stage. It may suggest that older/experienced decline firms adjust quickly toward their leverage targets. Consistent with the Trade-Off Theory, we identify: a positive relationship between size and long-term leverage during growth, mature and decline stages.

As expected, the ILEV variable presented a statistically significant positive sign with the long-term leverage in the growth stage.

The IP variable presented statistically significant positive signs for SL in the growth stage, LL in the maturity stage and TL in the maturity stage.

The relationship with INF showed a positive and statistically significant sign with leverage, especially with long-term leverage in the declining stage, explaining that higher inflation rates help those firms to adjust the book values of their leverage ratios and consequently increase their adjustment rates. As Portugal's and Spain's inflation rises, companies raise higher debt.

Our ER showed ambiguously a statistically significant positive signal with LL in the growth stage and negative with long-term leverage in the maturity and decline stage. These negative signs for mature and declining firms suggest that unfavorable exchange rates increase the cost of debt and therefore slow down the adjustment rates of these companies.

6. Conclusion

Our study investigated 15 years (2001-2016) using panel data to conclude on the adjustment rates for non-financial Iberian listed firms across three life cycle stages (growth, maturity and decline).

Using the Anthony and Ramesh (1992) methodology to classify firms into life cycle stages, we estimated equations for three proxies of leverage (our dependent variables): short-term leverage, long-term leverage and total leverage. We estimated nine equations with Fixed Effects considering three dependent variables and three life stages.

We found that during one accounting year, growing non-financial Iberian firms try to close their real leverages to their target leverages by 74%, 72% and 30% for short-term, long-term and total leverage, respectively. Mature firms did it by 54%, 52% and 30% for short-term, long-term and total leverage, respectively. In what concerns declining firms, we concluded that, with the exception for total leverage which presented a high adjustment rate of 72%, firms in decline stages are going away from their target leverages.

Moreover, we also found that for short-term and long-term leverage, growing firms have the highest leverage adjustment rates, suggesting that growing firms, having more investment opportunities, quickly adjust their short- and long-term debt to the response to them.

Conversely, for total leverage they are declining firms that have the highest rate of adjustment, indicating that declining companies have greater ease in adjusting their total capital structure, which includes not only short- and long-term debt, but also medium-term and other liabilities.

Furthermore, we found a low-high-low short-term capital structure pattern consistent with the Trade-Off Theory (hypothesis 2), consistent with the studies of Getzmann et al. (2014), Ahsan et al. (2016) and Rehman et al. (2016). For the remaining proxies for leverage (long-term and total), the patterns found were high-low-low, not consistent with any of our hypotheses.

It should also be highlighted that our results contribute to the finance literature and specifically when life cycle stages are considered, since we showed statistical significance among our tested leverages and its determinants, we also provide empirical evidence on

the introduction of the life cycle concept as one more explanatory factor to be taken into account when studying the capital structure of companies in Iberian firms' samples. In fact, our results suggest that Iberian firms, especially in growth and mature stages, follow a target capital structure and try to adjust it on its behalf.

For the total leverage, our results support the evidence of Ahsan et al. (2016) and Rehman et al. (2016), who argued that companies adjust their capital structure in the stages of growth, maturity and decline. However, for the short- and long-term leverage, our results for the decline stage show that firms do not follow an optimal capital structure, which is not consistent with these authors.

As such, our work has added, to the already diverse literature on capital structure, a dynamic explanatory factor: the business life cycle. This contribution provides a more insightful understanding of firms' decisions about their capital structure by differentiating themselves from the "normal" determinants of the capital structure.

As the limitations of our study we appoint: i) the low number of firm year observations registered for the growth (87) and decline stages (91); ii) the exclusion of some variables initially included in our baseline model because of its high VIF; and iii) the fact that the sample period includes an "atypical" period such as that of the 2008 financial crisis and 2012 Sovereign Debt crisis, as it makes it more difficult to generalize the results of our study to "more normal" periods.

For future researches in this area, we suggest: i) a study with a higher number of observations; ii) a complete analysis which includes all the variables included in our baseline model; iii) the examination of the impact of 2008 and 2012 financial crisis (validating its' impact not only in the relationship between capital structure and life cycle, but also in the leverage adjustment rate calculated for each life stage); and iv) the regression of these models with GMM (Generalized Method of Moments).

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